

THE MANAGEMENT OF PLANTAR WARTS – A PODIATRIC PERSPECTIVE

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The number of treatments offered for a particular condition is often indicative of the unsatisfactory success rate in curing the problem. This can be demonstrated by the documented plethora of treatments suggested for plantar warts (or verrucae), which range from the traditional to the bizarre — including banana skins, hypnosis and nail varnish. This paper aims to review the problem of plantar warts and take an evidence-based approach, balancing research findings coupled with the authors' combined 40 years of experience in managing this common problem.

KEY WORDS

Plantar warts
Debridement
Human papilloma virus
Hyperkeratosis
Salicylic acid
Occlusion
Cryotherapy

Diagnosis

For any treatment to be successful, it is important to establish the correct diagnosis. A wart, particularly when present on the plantar surface, can easily be mistaken for a corn (heloma durum). Differentiating lesions is based purely on clinical appearance. Firstly, corns are due to high pressure, therefore are found on weight-bearing areas such as under the metatarsal heads and on the dorsum or apices of the toes, whereas warts can potentially occur on any area of the foot. Corns generally are seen in adults, whereas

warts are more common in children. Close observation of the lesion can be helpful. With plantar warts, the normal dermatoglyphics end abruptly at the edge of the lesion (*Figure 1*), whereas with a corn they continue over or around the centre (*Figure 2*). Pinching a wart will be more painful for the sufferer than direct pressure; the converse is generally true with corns. Debridement of a wart will lead to a pinpoint pattern of bleeding as surface capillaries are cut. However, a corn is relatively avascular and so this effect is not seen. Occasionally the diagnosis is not straightforward as a small subset of lesions may exhibit characteristics of both a corn and a wart (*Figure 3*). Anecdotally, these may be lesions which originally started as warts but, because of their location on a weight-bearing area, have become keratinised, often with fibrous and vascular/neurological elements within them.

Epidemiology

Plantar warts are a very common problem, particularly among secondary school-aged children, with research suggesting a prevalence in this age group of around 4-5% (Williams et al, 1993). In fact, the figure may be higher as many sufferers will have symptomless warts and simply not recognise the problem, as patients rarely inspect the soles of their feet. For others, verrucae can be

a problem. The virus responsible enters the skin of the plantar area (sole) during barefoot activities — particularly when the skin barrier is compromised by excessive moisture. Johnson (1995) demonstrated a higher wart prevalence in those using showers when compared to those who didn't in a population of adults using communal changing facilities. In a unique paper, Ciconte (2003) undertook a quality-of-life study of 85 wart sufferers (11 of whom had plantar warts), following them up nine months later. Embarrassment and believing others would have a negative opinion of them were common issues among sufferers. Nearly three-quarters of the group had sought advice about the problem, mostly from their general practitioner. For those who had treatment, the majority (58%) felt it had been a failure, with half finding treatment painful and a small number suggesting it had caused scarring.

As many foot warts (like hand warts) do not cause any problems, they are probably best left alone until natural resolution occurs. In an immuno-competent individual, warts will naturally regress, although clinical experience shows that the time to resolution depends a lot on the age of the patient when the infection occurs. Generally, the older the patient, the longer the resolution. For example,

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Figure 1. A plantar wart demonstrating the abrupt cessation of dermatoglyphics at the edge of the lesion.



Figure 2. A corn demonstrating lack of capillaries, and dermatoglyphics running through the lesion.

a nine-year-old will clear their warts much faster than a 20-year-old, the former taking a few months while an adult may take many years. Published evidence on the natural history of the untreated wart to substantiate this clinical observation is difficult to obtain. Massing and Epstein (1963) in their much-quoted paper highlighted that natural clearance of warts in children was around 70% after two years, however only 46% of these children were entirely wart-free at this time. In a five-year follow-up of over 9,000 schoolchildren, Williams et al suggested a 93% clearance, although this figure also included warts that were treated.

The delayed resolution of warts could be explained by the nature of the human papilloma virus, which causes the condition. The viral particles reside deep inside the cells of the stratum spinosum, within the epidermis, meaning it is able to evade immune detection for some time. It is believed that once immune recognition is established, lesions show rapid clearance. Anecdotally, with plantar warts signs of regression include the appearance of black micro thrombi within the lesion with a slight increase in pain. Many of the treatments that are applied to warts are perhaps not specifically destroying the virus itself but merely alerting the immune system

to its presence. This is a recognised phenomenon clinically when treatment of a single wart, on the foot for example, may lead to spontaneous resolution of other lesions the patient may have elsewhere.

Doing nothing

Leaving the wart alone and not treating it has a number of advantages. Firstly, it is cheap. Secondly, there are no side effects such as pain, inflammation and scarring. Finally, one could suggest that if natural resolution occurs, natural immunity has been achieved, therefore patients should be at a decreased risk of subsequent infection — although there is little published evidence to substantiate this. Currently, many NHS Podiatry departments, like primary care surgeries, have a no treat policy, partly for the stated reason but also because of the generally disappointing cure rates obtained with many of the interventions available. Doing nothing has a success rate of around 30% (equivalent to a placebo effect) (Gibbs et al, 2002) so any active treatment would have to significantly improve on this figure to be considered effective.

Simple Measures

“Keep it simple and straightforward” is a useful motto to work by. Many patients with plantar warts can undertake some basic interventions at home. These include filing the overlying callus and then applying over-the-counter remedies of salicylic acid. Due to the thick epidermis of the plantar skin, any successful treatment requires the debridement of this overlying hyperkeratosis as it can act as a significant barrier to both chemical and physical agents such as cryotherapy. Debridement is easily undertaken at home by the patient with the use of a disposable emery board, and they should be advised to do this after the feet have been soaked to soften the overlying keratin and dispose of the emery board to prevent cross-infection of family members. Alternatively, a podiatrist can remove the overlying hyperkeratosis, rapidly and painlessly, with a scalpel. In many cases this treatment is sufficient

for patients to reduce pain and discomfort until natural resolution occurs. Salicylic acid can be applied to a debrided wart — it is thought the acid not only softens the skin but causes a mild inflammation. Evidence for the use of salicylic acid is strong — Gibbs et al, in their systematic review, demonstrated cure rates of up to 62% when using salicylic acid-based preparations — the highest cure rate for any researched wart treatment. For the majority of patients such an approach is safe, relatively pain-free and can continue until resolution of the wart occurs. This approach is particularly useful for younger patients; however, patients with diabetes and peripheral arterial disease require careful assessment.

A podiatrist is able to apply a higher strength salicylic acid preparation, following debridement. First, the area is masked to prevent lateral spread of the acid (*Figure 4*) and then covered with an apertured felt pad, which is strapped to the patient's foot. The patient would normally leave this on and keep it dry for at least 2-3 days. One week later, at a return visit, the podiatrist can then debride away the macerated tissue and apply more if deemed appropriate. Additionally, podiatrists may combine salicylic acid with other caustics such as monochloroacetic acid. Although there is no evidence to suggest improved efficacy, monochloroacetic acid has a strong caustic effect on plantar tissues. With this comes an increased risk of tissue breakdown and in a small number of cases an acute lymphangitis (Potter; Bristow, 2006) caused by drainage of the acid into the lymphatics, which can be misdiagnosed as a spreading infection.

Silver nitrate is another remedy employed by podiatrists, applied from a toughened pencil or as a solution onto the lesion. The treatment is relatively painless, with most patients reporting a short-lived stinging sensation, making it suitable for children. The treatment produces a black eschar. Evidence from two small studies has suggested an effectiveness



Figure 3. A mixed corn and wart lesion over the weight-bearing area of the forefoot.

ranging from 43 to 63% (Ebrahimi et al, 2007; Yazari, Basaran, 1994).

Occlusion

In 2002, an article was published in the *Archives of Paediatrics & Adolescent Medicine* advocating the use of Duct tape as a therapy (Focht et al, 2002). The authors suggested an 80% cure rate when compared with cryotherapy (62%). This subsequently led to an army of verruca sufferers wearing duct tape on their feet. However, the excitement was short-lived as a number of subsequent studies failed to show any significant effect (de Haen et al, 2006; Wenner et al, 2007). Whenever reviewing any research of cutaneous therapies for warts, it should be remembered that samples which include children are not likely to show the same effect in the wider population, as children are able to naturally resolve warts faster than adults, thus skewing results.

Frequently, parents express concern as they have been instructed to cover their child's warts when they are undertaking sporting activities in an attempt to reduce the spread of the virus. For example, some swimming pools advocate the use of verruca socks. To date there is no

evidence to suggest that they reduce infection rates among swimmers (Vaile et al, 2003; van Haalen et al, 2009). Moreover, swimmers suffering from hand warts are never required to wear waterproof gloves, so one could argue the wearing of such socks is futile when shed viral particles are likely to be already in the pool from those with warts on their hands.

Cryotherapy

Cryotherapy is often employed as a second-line treatment for cutaneous warts, including those on the foot. Essentially, a refrigerant is applied to the lesion to freeze and destroy virally infected tissue. Necrosis of the cells is thought to expose previously hidden viral antigens to the immune system, thus stimulating resolution. Evidence from a meta-analysis (Gibbs et al, 2002) suggests that liquid nitrogen and nitrous oxide may be effective techniques. However, in practice, variation in technique and application probably explains the differing opinions of its alleged success. More research into the optimum technique may help to improve therapy and cure rates. For example, prior to freezing, good debridement of the overlying keratin is required to expose the virally infected cells to the refrigerant. The cost

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effectiveness has also been questioned (Keogh-Brown et al, 2007) and practitioners may be put off by the initial expense of the equipment and storage requirements for the liquid nitrogen. In addition, the technique can be particularly painful and is therefore not suitable for children.

In attempting to overcome the storage issue, the use of aerosol-based devices has increased as they are considered more convenient and easier to store with a longer shelf life — some are even available over the counter. Although there are no published papers documenting their success rates, studies have questioned their use on all but the most superficial lesions, as temperatures attained by these units are not low enough to induce cell damage or necrosis (Burkhart et al, 2007; Gaspar, Dawber, 1997).

Low Level Laser

A number of podiatrists/podiatry departments use low laser therapy typically with a wavelength of 660nm in the management of warts. Treatment is painless and typically requires twice-weekly applications. Although there are some anecdotal reports on its use for plantar warts



Figure 4. Salicylic acid applied through an apertured mask to prevent lateral spread before a felt pad is applied.

(Turnball; Turner, Merriman, 2005) there is currently little to suggest it is an effective treatment.

Surgical Techniques

Curettage and electro-surgery for plantar warts is a technique which is often seen as a last resort when other therapies have failed. The success is largely reliant on the skill of the operator. It is vital that all infected tissue is removed to prevent regrowth of the lesion. Evidence for its effectiveness is limited to a small number of studies reporting a 65-85% efficacy (Gibbs et al, 2002). Permanent scarring can result at the operative site.

Summary

Plantar warts (verrucae) are a very common problem. As most lesions spontaneously resolve with time, reassurance is often the only form of treatment therapy required. Evidence for the effectiveness of treatment is lacking and often frustrating. Subsequently, many NHS Trusts view plantar warts as a very low priority as far as providing treatments, but the effect on the quality of life of plantar warts to some patients should not be underestimated. Consequently, patients may prefer to seek treatment from private chiropodists and podiatrists. In conclusion, careful consideration is required in selecting the most appropriate type of treatment as well as informing the patient of the likely outcomes before any intervention. **DN**

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